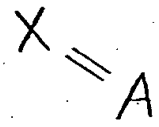
APPENDIX F

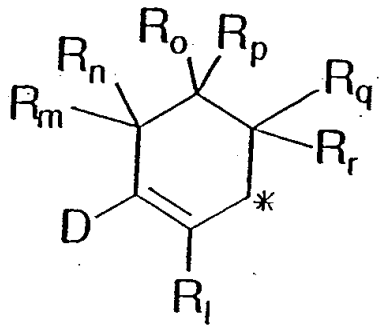
Re: U.S. Patent Application No. 09/285,937
Our Ref.: 616758-3/JP

Claim 1. (amended twice) A compound having a formula A:

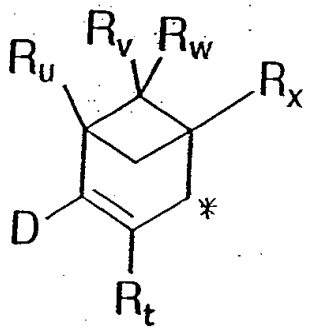


(formula A)

wherein X is selected from the group consisting of



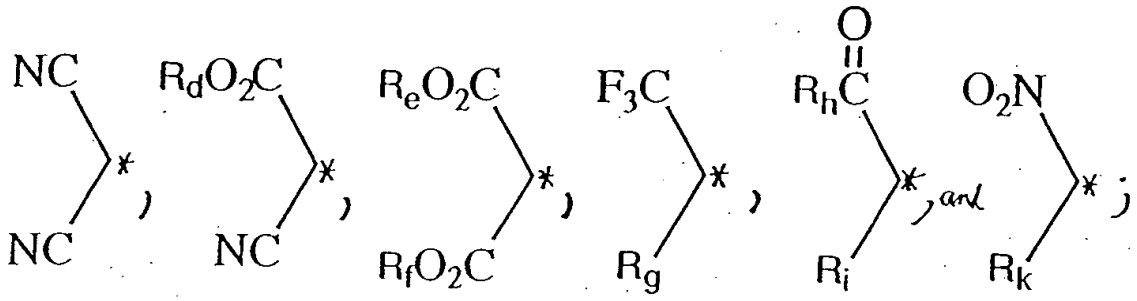
and



wherein D is selected from the group consisting of NR_aR_b, OR_a, SR_a, PR_aR_b, and R_c;

wherein A is selected from the group consisting of:

APPENDIX F



wherein R_a, R_b, and R_c are the same or different and are each independently selected from the group consisting of: H; a linear, branched, or cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group;

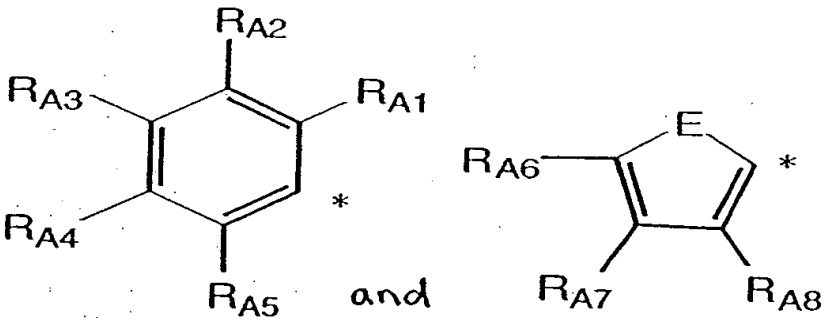
wherein R_d, R_e, R_f, R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_s, R_t, R_u, R_v, R_w, and R_x are the same or different and are each independently selected from the group consisting of: H; a linear, branched, or cyclic hydrocarbon group that is saturated or unsaturated; a linear, branched, or cyclic alkyl group;- $(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group;

B1 Cont.

wherein R_g, R_h, R_i, and R_k are the same or different and are each independently selected from the group consisting of: H; a linear, branched, or cyclic hydrocarbon group that is saturated or unsaturated; a linear, branched, or cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; an aryl group; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; $-CO_2R_d$; and $-COR_d$;

APPENDIX F

wherein each aryl group is optionally independently selected from the group consisting of



;

wherein R_{A1}, R_{A2}, R_{A3}, R_{A4}, R_{A5}, R_{A6}, R_{A7}, and R_{A8} are the same or different and are each independently selected from the group consisting of H, a linear alkyl group, a branched alkyl group, and a cyclic alkyl group;

B, Cont.

wherein E is selected from the group consisting of S, O, and NR_s;

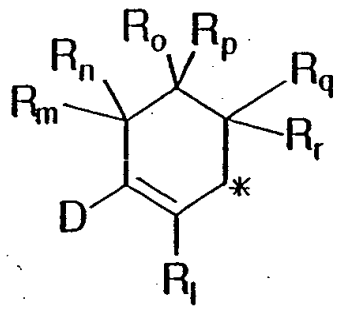
wherein the alkyl group is optionally substituted or unsubstituted and optionally includes up to 25 carbon atoms;

wherein α is an integer that is greater than or equal to 0 and less than or equal to 25;

wherein β is an integer that is greater than or equal to 0 and less than or equal to 25;

wherein γ is an integer that is greater than or equal to 0 and less than or equal to 25;

wherein when: D is CH_3; R_l, R_m, R_n, R_q, and R_r are each H; R_o is H, methyl, ethyl, propyl, or butyl; R_p is H, methyl, ethyl, propyl, or butyl; and X is



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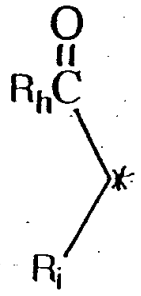
then: A is not C(CN)(CN); and

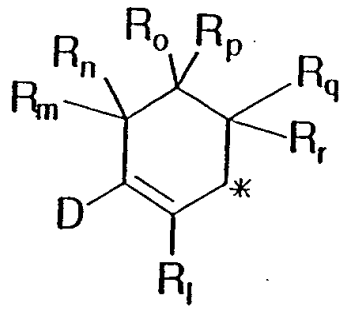
R_h is not methyl, ethyl, propyl, or butyl when R_i is H and A is

B1 cont

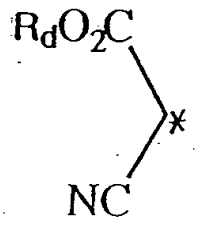


wherein when: D is CH_3; R_l, R_m, R_n, R_q, and R_r are each H; R_o is H, methyl, ethyl, propyl, or butyl; R_p is H, methyl, ethyl, propyl, or butyl; X is

APPENDIX F



and A is

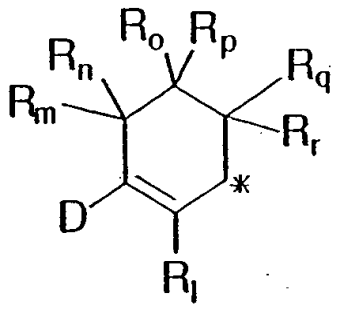


B1 cont

then: R_d is not methyl, ethyl, propyl, or butyl; and

wherein when: R_l is H, Cl, Br, or I; R_m, R_n, R_q, and R_r are each H; R_o is H, methyl, ethyl, propyl, butyl, or aryl; R_p is H, methyl, ethyl, propyl, butyl, or aryl; A is C(CN)(CN); and X is

APPENDIX F



)

then: D is not methyl;

D is not OR_a when R_a is H, methyl, ethyl, propyl, butyl, or aryl;

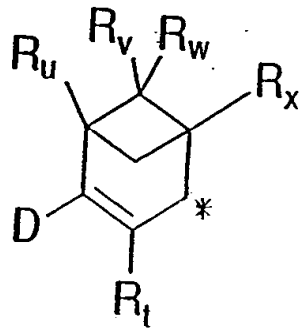
ß is not equal to 1, 2, 3, or 4 when α is 0 and D is $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; and

ß is not equal to 0 when α is 0, D is $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$, and R_{A1} is methyl, ethyl, propyl, or butyl.

B1 cont.

Claim 2. (amended twice) A compound as claimed in Claim 1, wherein X is

APPENDIX F



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APPENDIX H

Re: U.S. Patent Application No. 09/285,937
Our Ref.: 616758-3/JP

Please add the following new claims.

39. A compound as claimed in Claim 1,

wherein when D is NR_aR_b, then α is greater than or equal to 1 and less than or equal to 25;

wherein when R_l, R_m, R_n, R_o, and R_p are each H, and R_q, R_r, and D are each $-CH_3$, A is not C(CN)(CN);

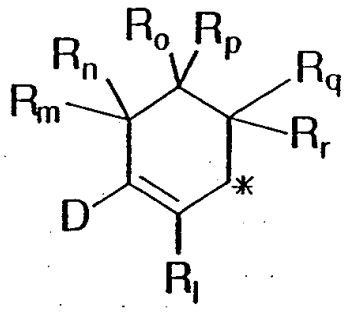
wherein when R_l, R_o, R_p, R_q, and R_r are each H, and R_n, R_m, and D are each $-CH_3$, A is not C(CN)(CN).

B2

APPENDIX H

40. A compound as claimed in Claim 1,

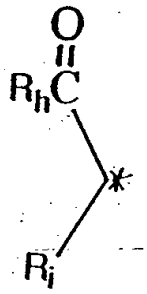
wherein when: D, R_l, R_m, R_n, R_o, R_p, R_q, and R_r are each H, Br, Cl, I, methyl, ethyl, propyl, butyl, or aryl; and X is



)

then: A is not C(CN)(CN); and
R_h is not methyl, ethyl, propyl, or butyl
when R_i is H and A is

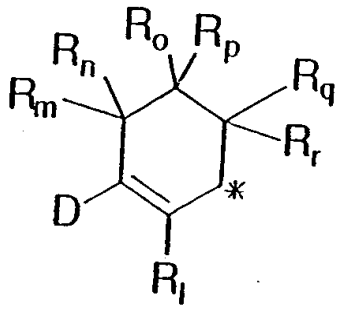
B2 Cont.



;

wherein when: D, R_l, R_m, R_n, R_o, R_p, R_q, and R_r are each H, Br, Cl, I, methyl, ethyl, propyl, butyl, or aryl; and X is

APPENDIX H



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and A is

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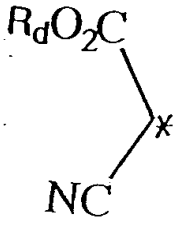


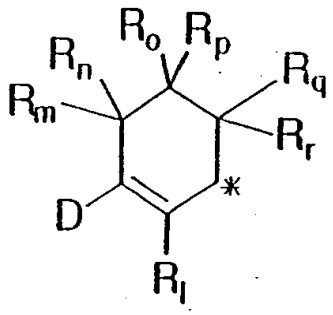
)

then: R_d is not methyl, ethyl, propyl, or butyl; and

wherein when: R_l, R_m, R_n, R_o, R_p, R_q, and R_r are each H, Br, Cl, I,

APPENDIX H

methyl, ethyl, propyl, butyl, or aryl; A is C(CN)(CN); and X is



)

then: D is not H, Br, Cl, I, methyl, ethyl, propyl, butyl, or aryl;
D is not OR_a when R_a is H, methyl, ethyl, propyl, butyl, or aryl;
ß is not equal to 1, 2, 3, or 4 when α is 0 and D is $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; and
ß is not equal to 0 when α is 0, D is $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$, and R_{A1} is methyl, ethyl, propyl, or butyl.

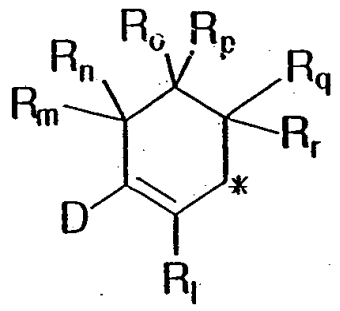
B2 cont.

APPENDIX H

41. A compound as claimed in Claim 1,

wherein when: R_l, R_m, R_n, R_o, R_p, R_q, and R_r are each H, Br, Cl, I, alkyl, or aryl;

D is H, Br, Cl, I, alkyl, aryl, OR_a, $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$, or $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; and X is



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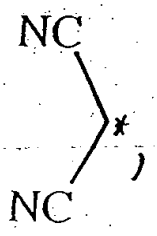
then: A is not

B2 cont.



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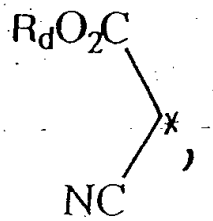

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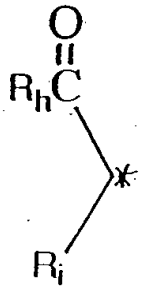

42. A composition comprising a liquid-crystal mixture and a

compound as claimed in Claim 1.

43. A method for reducing an operation voltage of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 1 to the liquid-crystal mixture.

44. A method for tuning a clearing temperature of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 1 to the liquid-crystal mixture.

45. A method for tuning birefringence of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 1 to the liquid-crystal mixture.

46. A method for increasing a $\partial n/\partial T$ of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 1 to the liquid-crystal mixture to yield a resulting mixture, wherein the resulting mixture at about 20-30°C has a $\partial n/\partial T$ larger than about 0.005, wherein n is a refractive index of the resulting mixture and T is a temperature of the resulting mixture in °C.

47. A composition comprising a liquid-crystal mixture and a compound as claimed in Claim 2.

48. A method for reducing an operation voltage of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 2 to the liquid-crystal mixture.

49. A method for tuning a clearing temperature of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 2 to the liquid-crystal mixture.

APPENDIX H

50. A method for tuning birefringence of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 2 to the liquid-crystal mixture.

51. A method for increasing a $\partial n/\partial T$ of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 2 to the liquid-crystal mixture to yield a resulting mixture, wherein the resulting mixture at about 20-30°C has a $\partial n/\partial T$ larger than about 0.005, wherein n is a refractive index of the resulting mixture and T is a temperature of the resulting mixture in °C.

52. A composition comprising a liquid-crystal mixture and a compound as claimed in Claim 3.

53. A method for reducing an operation voltage of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 3 to the liquid-crystal mixture.

B2 cont.

54. A method for tuning a clearing temperature of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 3 to the liquid-crystal mixture.

55. A method for tuning birefringence of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 3 to the liquid-crystal mixture.

56. A method for increasing a $\partial n/\partial T$ of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 3 to the liquid-crystal mixture to yield a resulting mixture, wherein the resulting mixture at about 20-30°C has a $\partial n/\partial T$ larger than

about 0.005, wherein n is a refractive index of the resulting mixture and T is a temperature of the resulting mixture in °C.

57. A composition comprising a liquid-crystal mixture and a compound as claimed in Claim 39.

58. A method for reducing an operation voltage of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 39 to the liquid-crystal mixture.

59. A method for tuning a clearing temperature of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 39 to the liquid-crystal mixture.

60. A method for tuning birefringence of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 39 to the liquid-crystal mixture.

B2 cont.

61. A method for increasing a $\partial n/\partial T$ of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 39 to the liquid-crystal mixture to yield a resulting mixture, wherein the resulting mixture at about 20-30°C has a $\partial n/\partial T$ larger than about 0.005, wherein n is a refractive index of the resulting mixture and T is a temperature of the resulting mixture in °C.

C2

62. A composition comprising a liquid-crystal mixture and a compound as claimed in Claim 40.

63. A method for reducing an operation voltage of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 40 to the liquid-crystal mixture.

APPENDIX H

64. A method for tuning a clearing temperature of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 40 to the liquid-crystal mixture.

65. A method for tuning birefringence of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 40 to the liquid-crystal mixture.

66. A method for increasing a $\partial n/\partial T$ of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 40 to the liquid-crystal mixture to yield a resulting mixture, wherein the resulting mixture at about 20-30°C has a $\partial n/\partial T$ larger than about 0.005, wherein n is a refractive index of the resulting mixture and T is a temperature of the resulting mixture in °C.

B2 cont.

67. A composition comprising a liquid-crystal mixture and a compound as claimed in Claim 41.

68. A method for reducing an operation voltage of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 41 to the liquid-crystal mixture.

69. A method for tuning a clearing temperature of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 41 to the liquid-crystal mixture.

70. A method for tuning birefringence of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 41 to the liquid-crystal mixture.

APPENDIX H

71. A method for increasing a $\partial n/\partial T$ of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 41 to the liquid-crystal mixture to yield a resulting mixture, wherein the resulting mixture at about 20-30°C has a $\partial n/\partial T$ larger than about 0.005, wherein n is a refractive index of the resulting mixture and T is a temperature of the resulting mixture in °C.

72. The compound as claimed in Claim 1, wherein the compound is colorless or virtually colorless.

73. The compound as claimed in Claim 1, wherein the compound has an absorption loss in a visible spectrum at approximately 20-30°C of greater than or equal to 0% and less than or equal to about 5%.

74. The compound as claimed in Claim 1, wherein the compound has an absorption loss in a visible spectrum at approximately 20-30°C of greater than or equal to 0% and less than or equal to about 1%.

75. The compound as claimed in Claim 1, wherein the compound has an absorption loss in a visible spectrum at approximately 20-30°C of greater than or equal to 0% and less than or equal to about .01%.

76. The composition as claimed in Claim 9, wherein the compound is colorless or virtually colorless.

77. The composition as claimed in Claim 9, wherein the compound has an absorption loss in a visible spectrum at approximately 20-30°C of greater than or equal to 0% and less than or equal to about 5%.

APPENDIX H

78. The composition as claimed in Claim 9, wherein the compound has an absorption loss in a visible spectrum at approximately 20-30°C of greater than or equal to 0% and less than or equal to about 1%.

B2 cont.

79. The composition as claimed in Claim 9, wherein the compound has an absorption loss in a visible spectrum at approximately 20-30°C of greater than or equal to 0% and less than or equal to about .01%.